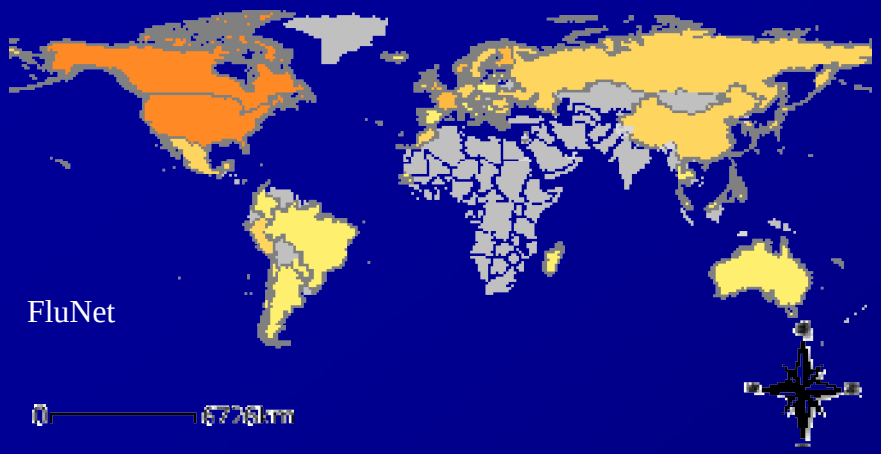
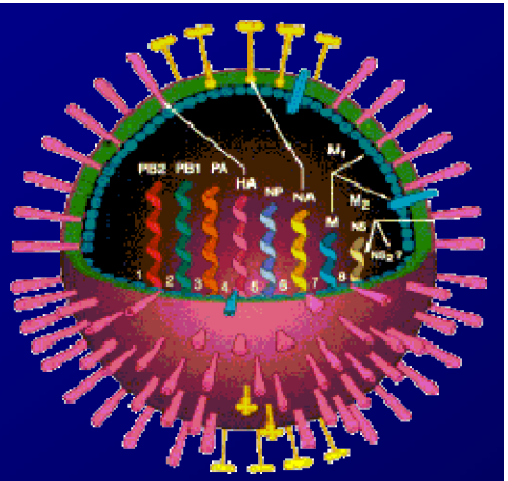




Pandemic Influenza Surveillance

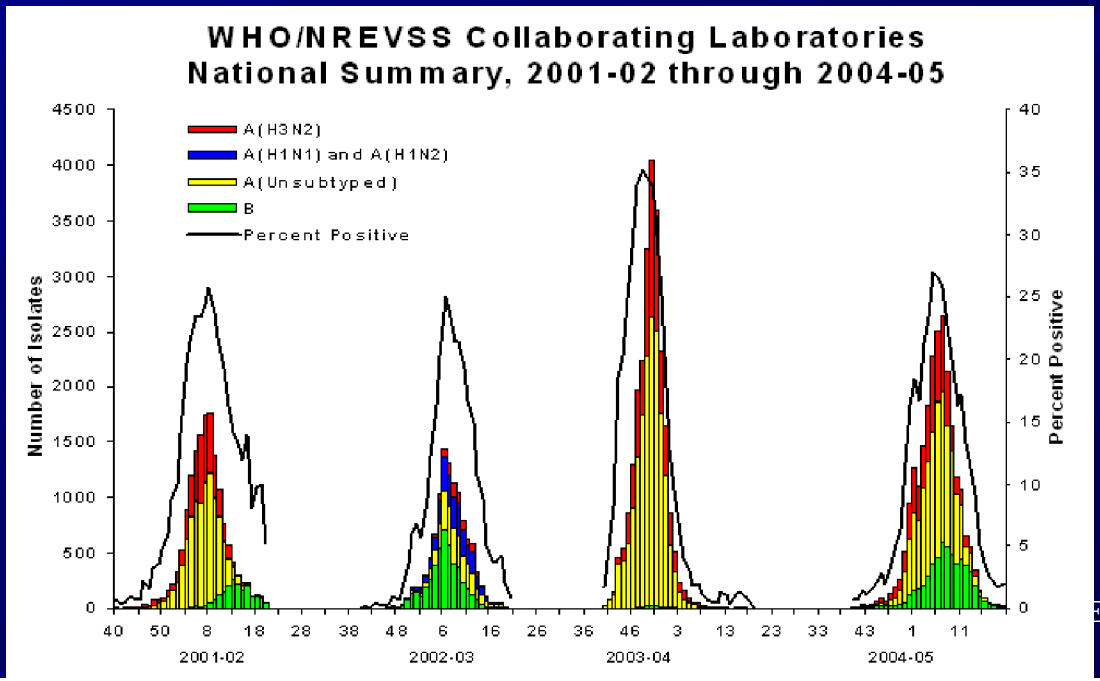
Laura Erhart, MPH

Arizona Department of Health Services

March 30, 2006

Influenza

- Seasonal influenza each year
- Can be either influenza A or B
  - Predominant strain varies
  - A/H3N2 or B strains in recent years



Arizona Department of Health Services

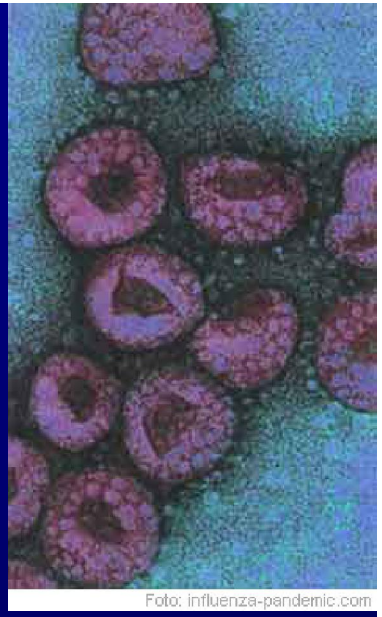
Requirements for a pandemic

- "Novel" virus
- Virus can cause human illness
- Susceptible population
- Easy person-to-person transmission

Requirements for a pandemic

- "Novel" virus is created by antigenic shift: the dramatic, unpredictable change in virus's surface proteins to produce new combination
- Novel viruses derived from:
  - Reassortment of animal and human flu viruses
  - Direct transmission of animal viruses to humans
  - Adaptation of non-human virus in intermediate host before transmission to humans
    - e.g. avian -> swine -> humans

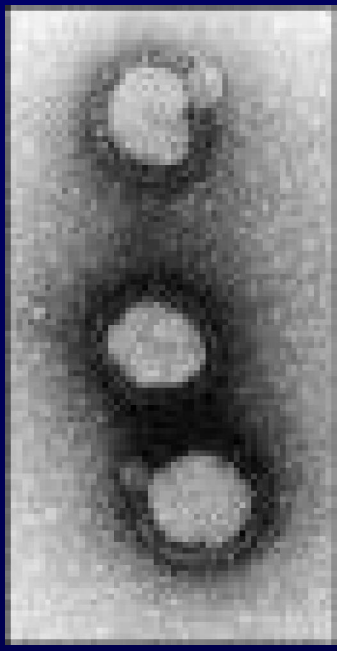
Two categories of flu surveillance



- Virologic surveillance
  - Identification of the virus & its specific attributes
- Disease surveillance
  - How many people are sick? Who is affected? How sick are they? What is the geographic spread?

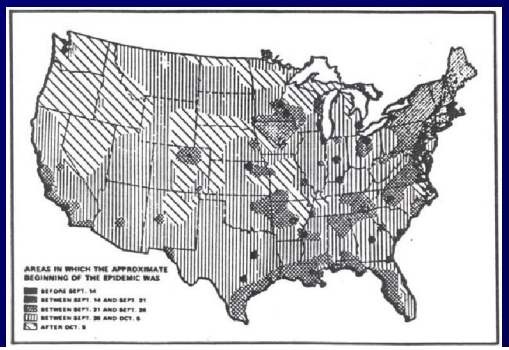
Goals of virologic surveillance

- Rapidly detect the introduction and early cases of an influenza virus in the U.S., and the specific introduction into Arizona.
- Track the virus' introduction into local areas.
- Monitor changes in the virus, including development of antiviral resistance.

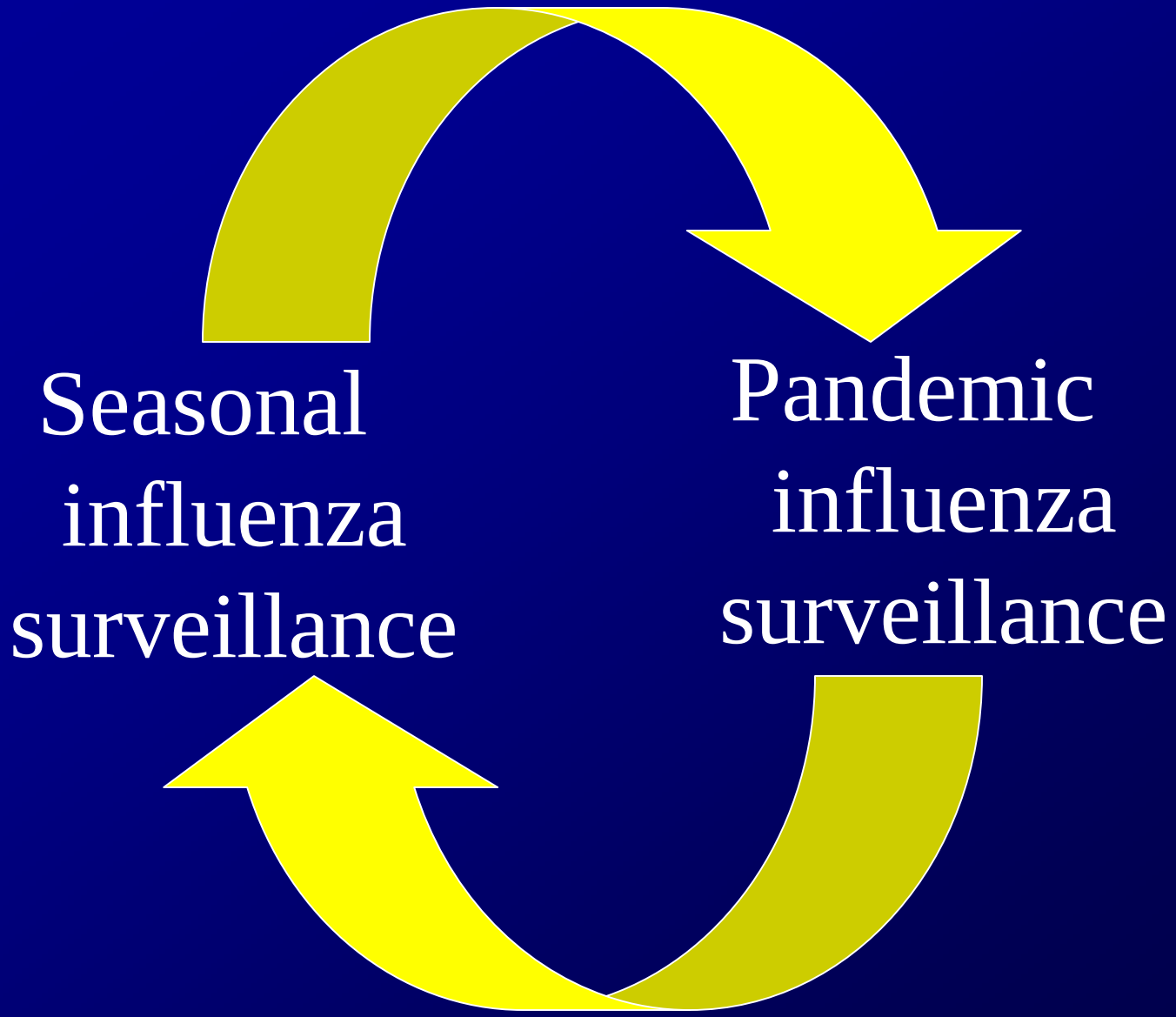


Goals of disease surveillance

- Detect increases in influenza-like illness (ILI) in the community.
- Monitor the impact on health (outpatient visits, hospitalizations, and deaths).
- Track trends in influenza disease activity and identify populations that are severely affected.



Arizona Department of Health Services

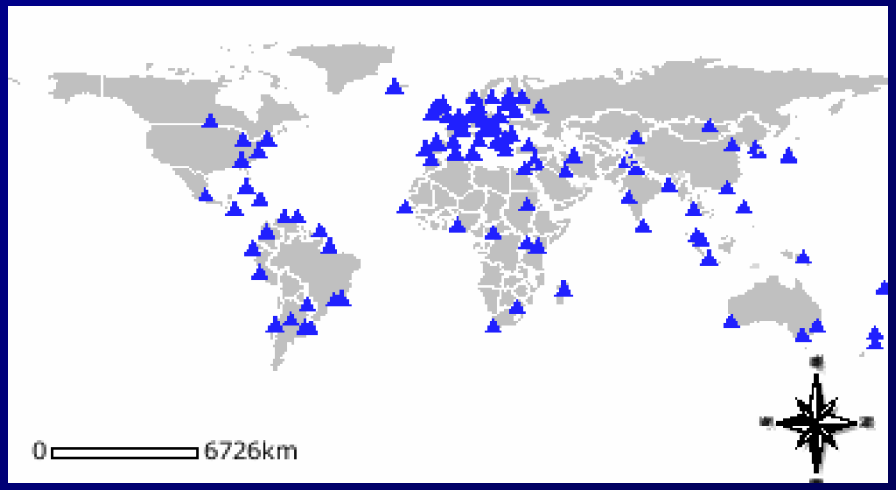

Seasonal influenza surveillance
Pandemic influenza surveillance

Surveillance preparations for pandemic readiness

- Pandemic planning components recommended by DHHS for Interpandemic and Pandemic Alert Periods are seasonal influenza surveillance components
- A strong seasonal surveillance system will help us detect the arrival of pandemic flu.
- Preparations for pandemic flu can strengthen seasonal flu surveillance.

Seasonal global surveillance

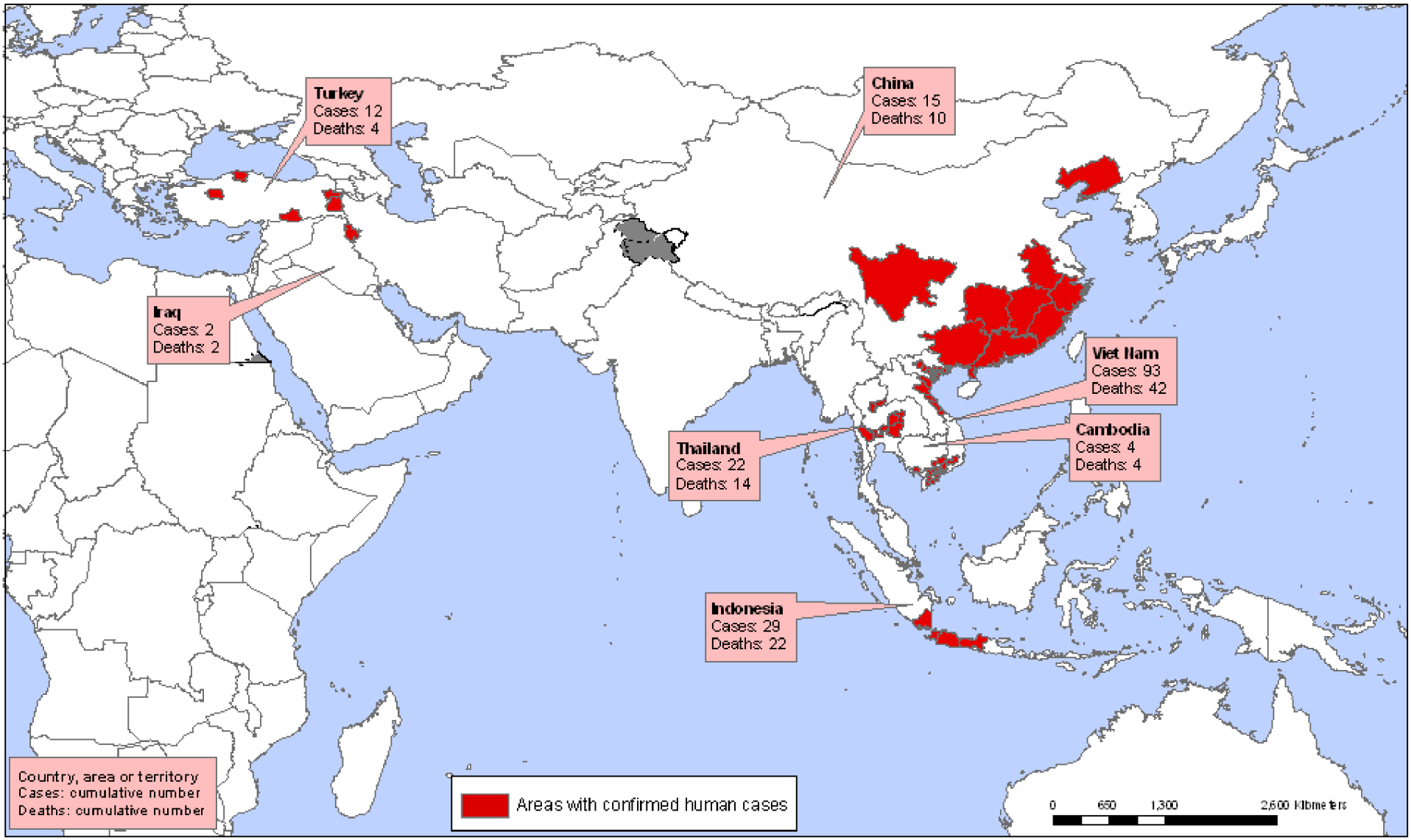
- Detect emergence & spread of new antigenic variants
- Update formulation of influenza vaccines
- Provide early warning of next pandemic



WHO Collaborating Centers for Influenza

Affected areas with confirmed human cases of H5N1 avian influenza since 2003

Status as of 16 March 2006



World Health Organization

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: WHO / Map Production: Public Health Mapping and GIS
Communicable Diseases (CDS) World Health Organization

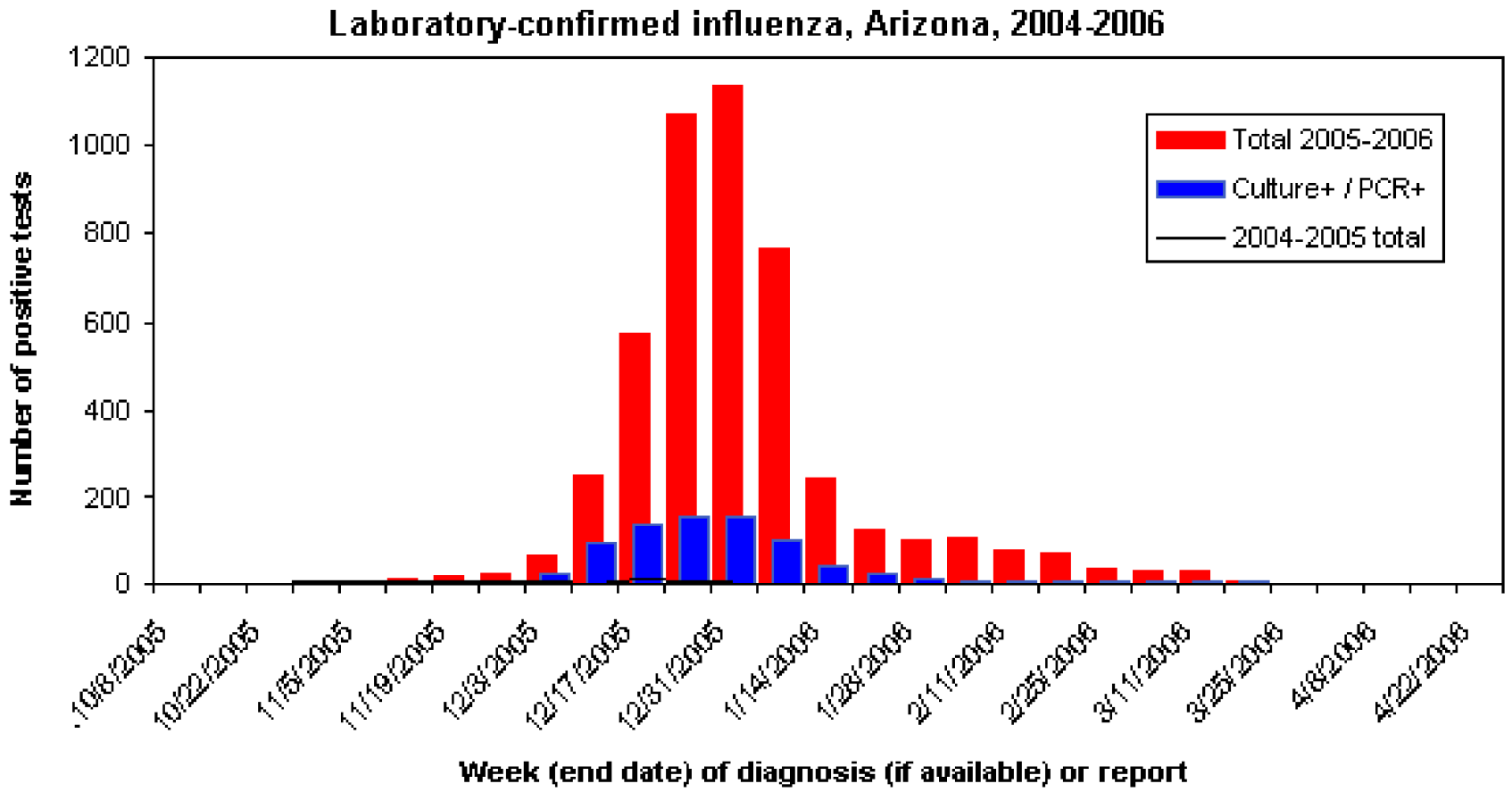
Seasonal surveillance in U.S.

- Measures used to describe a flu season:
  - Laboratory data
    - Submissions + positive results
    - Antigenic characterization
  - Influenza-like illness (ILI) sentinel surveillance
  - Pneumonia & influenza mortality (P&I)
  - Pediatric influenza-associated hospitalizations & deaths
  - Weekly state reports of level of activity

Seasonal surveillance in Arizona

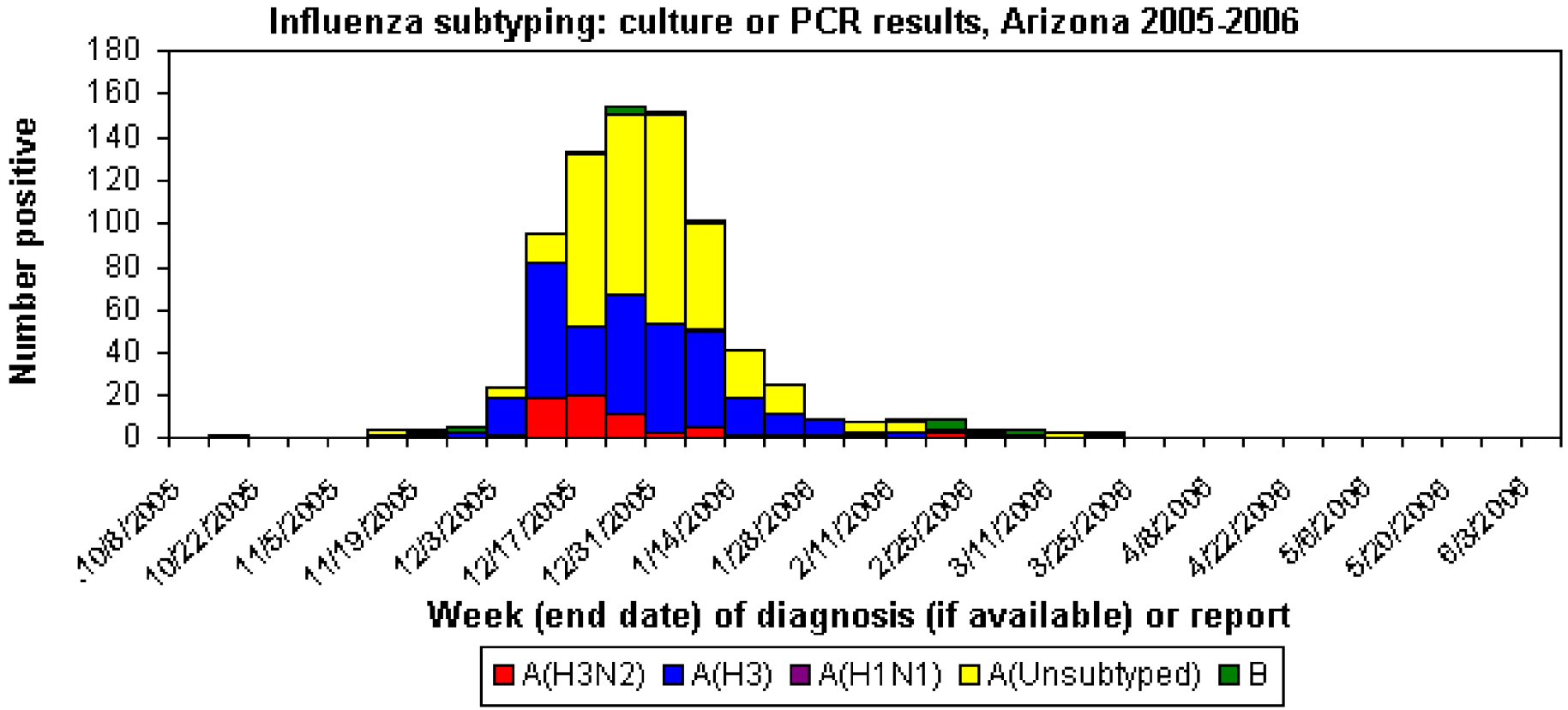
- Laboratory data
  - Lab-reportable starting 2004-2005 season
  - State lab subtyping data
- ILI sentinel surveillance (~60 sites/year)
- Local health surveillance
  - Hospital emergency department admissions, school absenteeism, mortality data
- Pediatric influenza-associated mortality

Lab-reporting of influenza



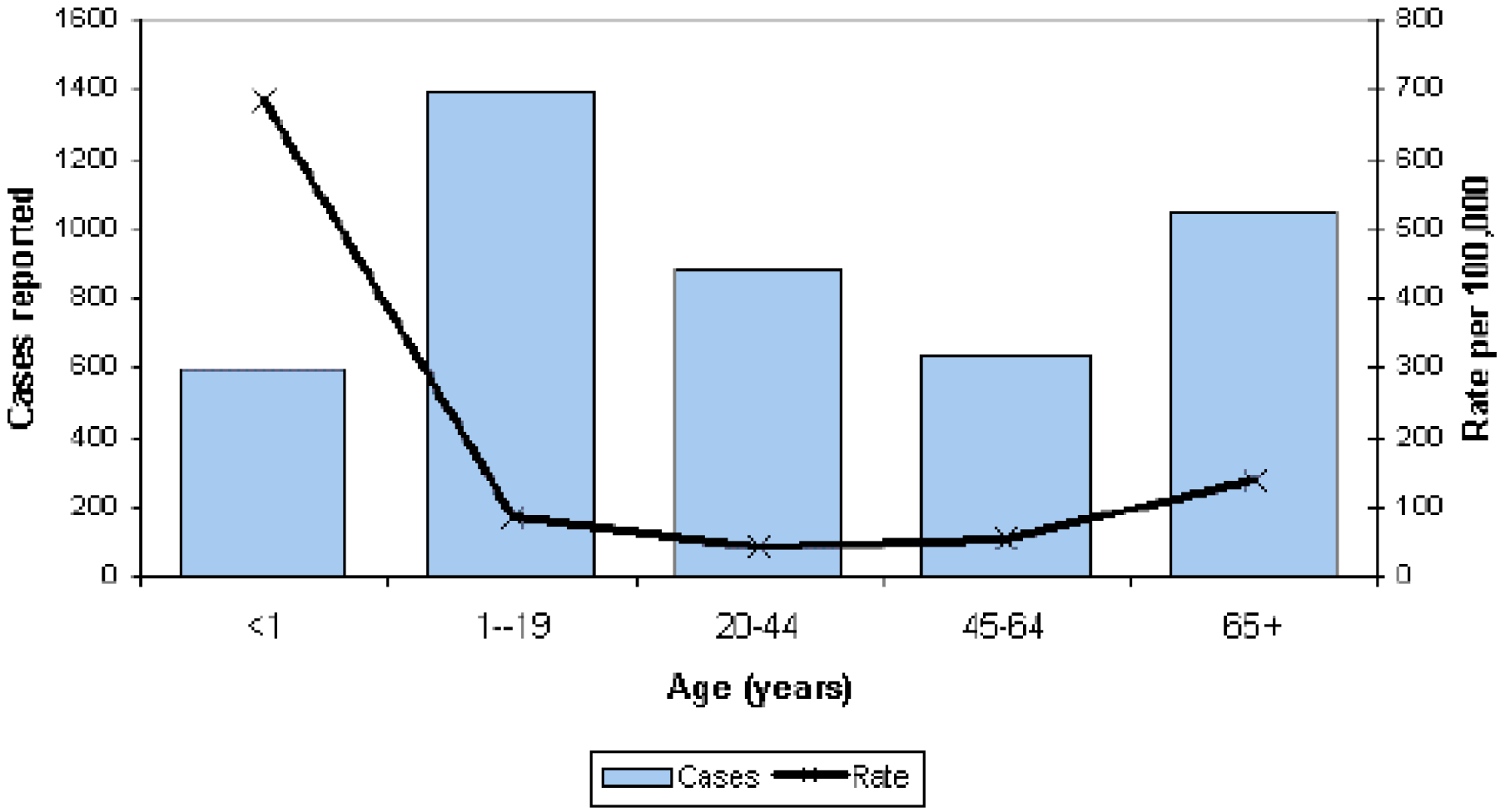
Note: Because the above data are shown by week of diagnosis, the decrease in recent weeks in part reflects an inherent delay in reporting.

Influenza subtyping

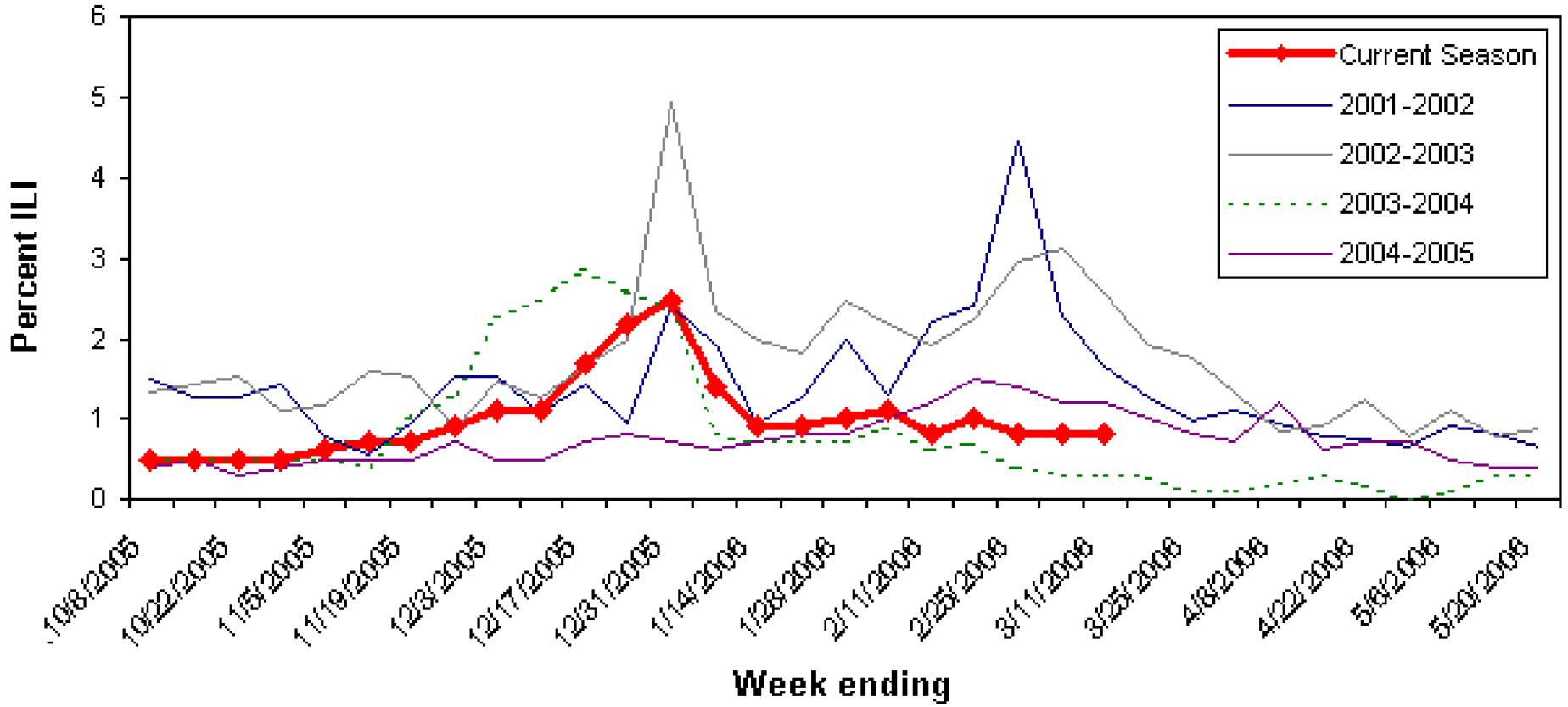


Arizona Department of Health Services

Ages of lab-confirmed cases



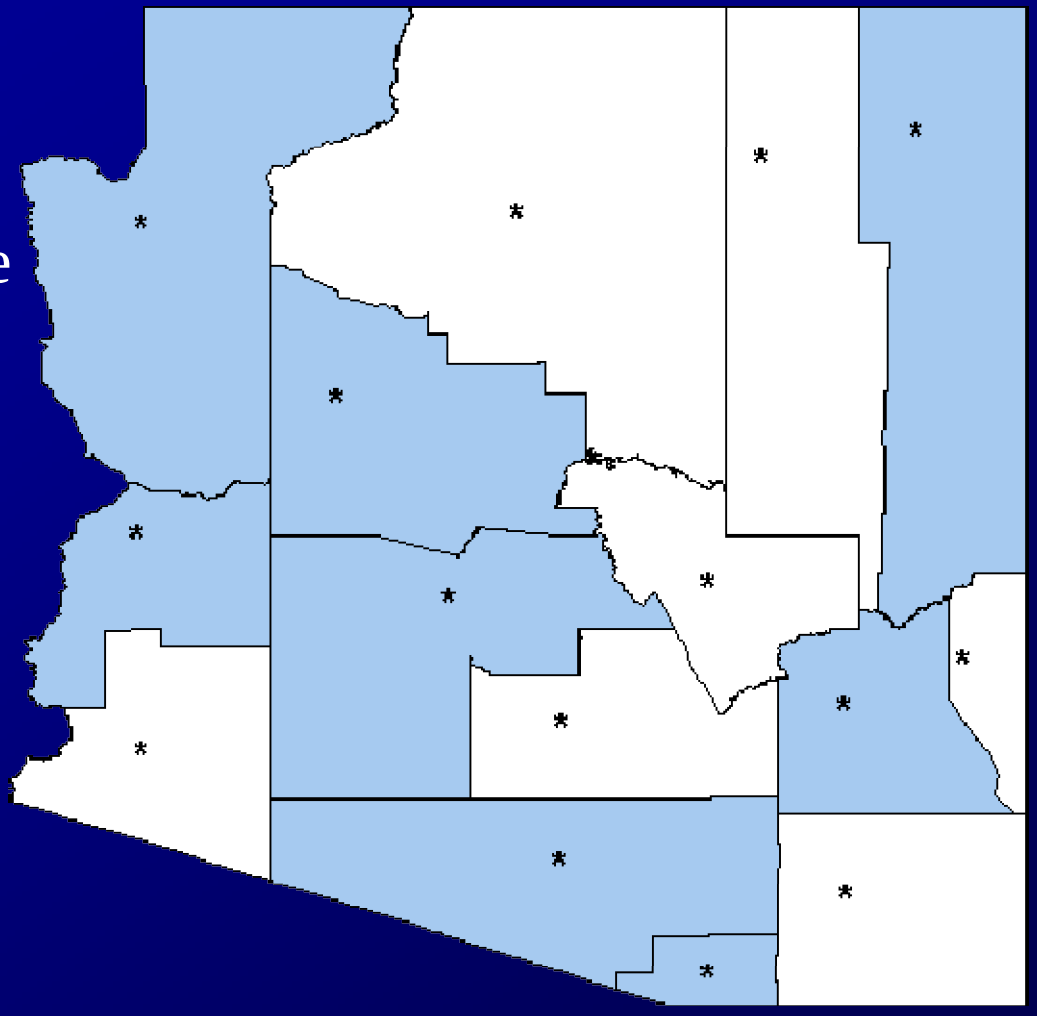
Influenza-like illness (ILI)



Influenza around the state

Blue: low-intermediate activity

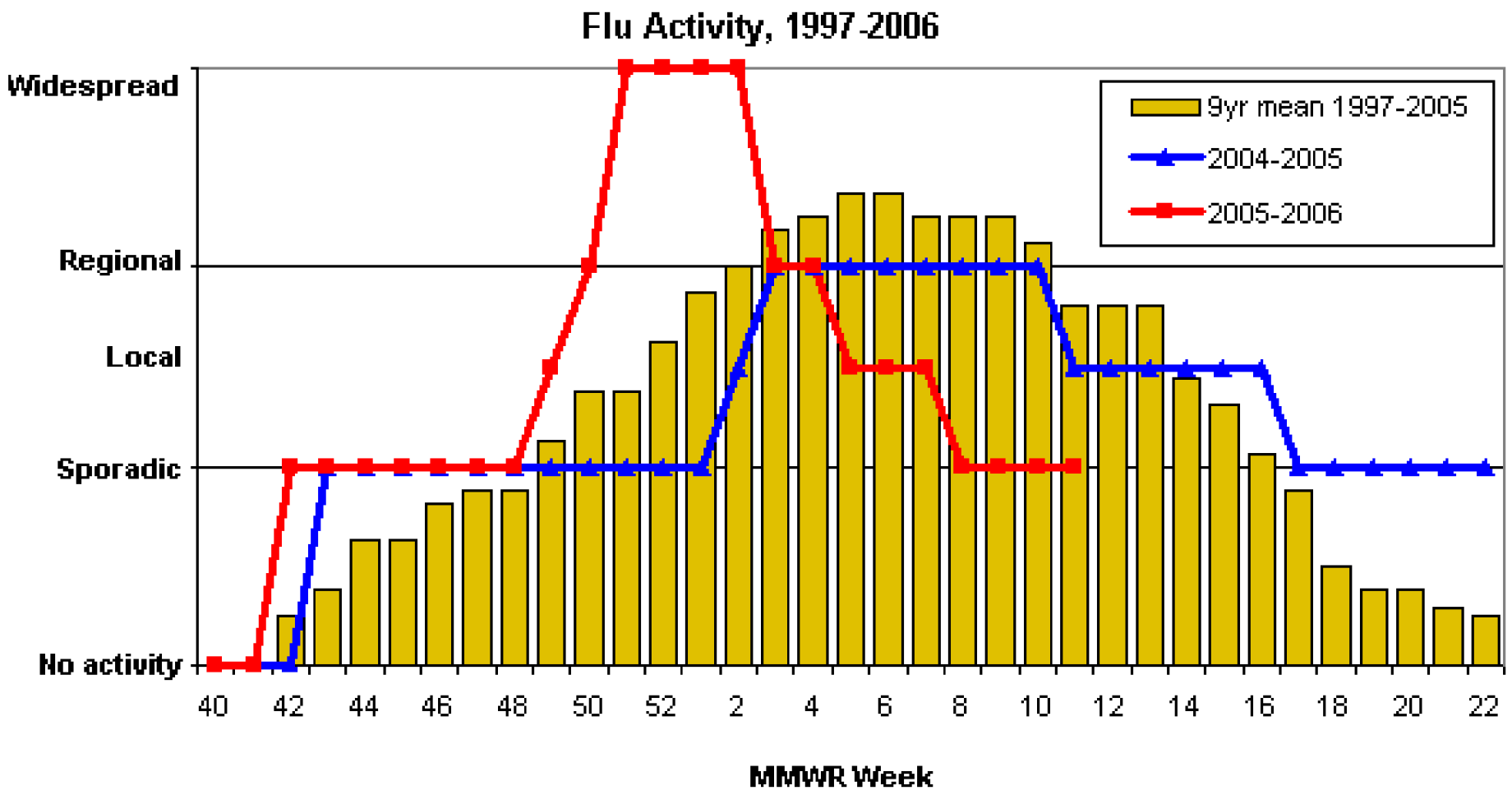
White: no activity reported in past three weeks



Infectious Disease Epidemiology

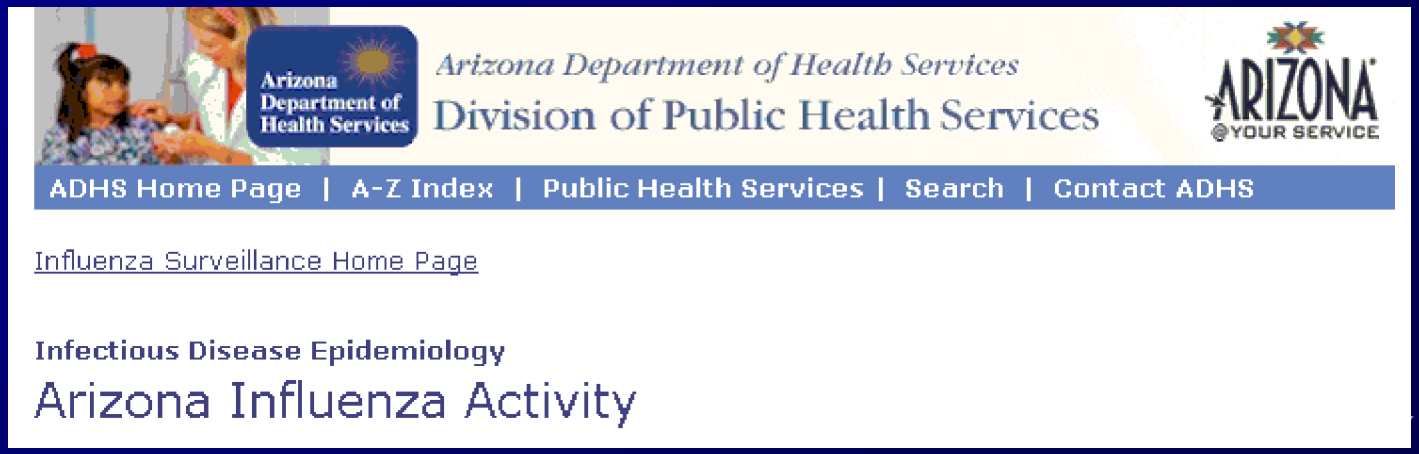
Arizona Department of Health Services

Arizona flu activity, 1997-2006



Seasonal surveillance communications in Arizona

- Weekly conference calls with county flu surveillance coordinators
- Flu surveillance update sent weekly via HAN to public health partners
- ADHS flu surveillance website updated weekly



Arizona Department of Health Services

Table C–1: Summary of WHO Global Pandemic Phases (WHO Global Influenza Preparedness Plan, 2005)

Interpandemic Period

Phase 1. No new influenza virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection may be present in animals. If present in animals, the risk of human infection or disease is considered to be low

Phase 2. No new influenza virus subtypes have been detected in humans. However, a circulating animal influenza virus subtype poses a substantial risk of human disease

Pandemic Alert Period

Phase 3. Human infection(s) with a new subtype but no human-to-human spread or at most rare instances of spread to a close contact

Phase 4. Small cluster(s) with limited human-to-human transmission but spread is highly localized, suggesting that the virus is not well adapted to humans

Phase 5. Larger cluster(s) but human-to-human spread is still localized, suggesting that the virus is becoming increasingly better adapted to humans but may not yet be fully transmissible (substantial pandemic risk)

Pandemic Period

Phase 6. Pandemic phase: increased and sustained transmission in the general population

Postpandemic Period

Return to the Interpandemic Period (Phase 1)

Pandemic Alert – Phase 3

- Surveillance enhancements:
  - Screening for novel viruses (e.g. H5) in persons meeting clinical & epidemiological criteria
  - Closer monitoring of surveillance components; ensure timely & complete reporting
  - Report to CDC & send isolates of unusual/untypeable viruses
  - Increased internal & external communications

Pandemic Alert – Phase 4

- Closer monitoring of prior components.
- Investigate suspicious clusters/outbreaks.
- Consider active surveillance for deaths & hospitalizations.
- Consider emergency measure to make flu-associated hospitalizations reportable.
- Increase specimen collection & lab testing.

Pandemic Alert – Phase 5

- Continuation of earlier surveillance operations
  - Will likely be coordinated under the Surveillance Group in the ADHS PHIMS structure
- Greater frequency of communications and analysis of surveillance data

Pandemic Period – Phase 6

- Early part of Phase 6: Additional activities:
  - Use data to reassess vaccine & antiviral priority groups.
  - Focus laboratory surveillance on detecting antigenic drift variants or re-assortment viruses.
  - Enhance mortality surveillance.
- Later in Phase 6: Scaled-back surveillance
  - "Activities of the national influenza surveillance system will revert to the frequency and intensity typically seen during interpandemic influenza seasons."
  - Resources will be diverted to other activities.

What do we do now?

Seasonal & pandemic disease surveillance enhancements

- Recruit additional regularly-reporting sentinel sites for year-round ILI surveillance
- Ensure adequate representation and consistent reporting of ILI from sentinel sites.
- Develop a protocol for investigating institutional outbreaks in conjunction with local health departments.

Laboratory/virologic surveillance enhancements

- Increase geographic representation of isolates.
- Explore options for increasing specimen collection from sentinel sites, outbreaks & unusual cases.
- Develop sampling scheme for laboratory surveillance during pandemic.
- Assess ability to transport specimens to the state laboratory quickly; explore the feasibility and need for courier service or other transport options.

Informatics enhancements

- MEDSIS and integration of the Electronic Laboratory Reporting (ELR) component:
  - More timely data from laboratories using the ELR
    - Automatic upload
    - Web entry for low-volume clinical labs
  - Less staff time needed for data entry => shorter lag time and more timely analysis
  - Potential for future enhancements such as: reporting of hospitalized influenza cases, hospital emergency department data such as chief complaint or discharge summary, or hospital admissions for influenza.

Informatics enhancements (2)

- Flexibility of MEDSIS or SIREN to quickly accommodate other electronic surveillance needs for various pandemic phases
- Implementation of StarLIMS at State Laboratory (new laboratory information system) that will transmit data to MEDSIS automatically.

Secure Integrated Response Electronic Notification
SIREN

medsis
Medical Electronic Disease Surveillance Intelligence System

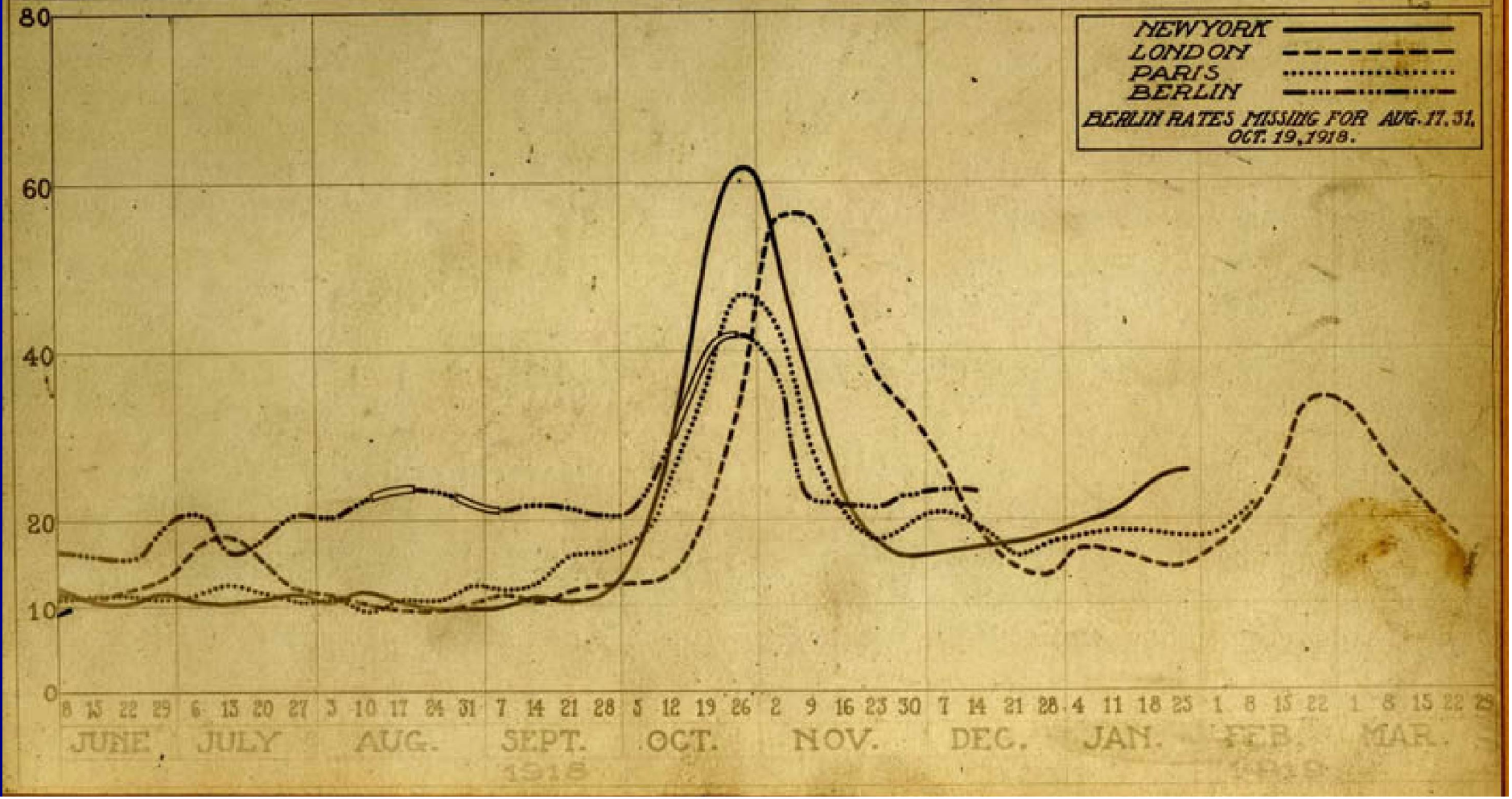
More questions

- Nationwide enhancement of outpatient or hospitalization surveillance
  - Reporting of flu-associated hospitalizations?
  - Supplement to ILI sentinel provider network?
  - Active surveillance?
- Mortality surveillance statewide
- Syndromic surveillance
  - Identification of nontraditional flu data sources
  - Validation & incorporation of data into routine surveillance

INFLUENZA PANDEMIC

MORTALITY IN AMERICA AND EUROPE DURING 1918 AND 1919

DEATHS FROM ALL CAUSES EACH WEEK EXPRESSED AS AN ANNUAL RATE PER 1000



ADHS contacts & resources

- Laura Erhart
  - erhartl@azdhs.gov 602-364-3674
- Dan Bronson-Lowe
  - bronsod@azdhs.gov 602-364-3148
- Susan Goodykoontz
  - goodyks@azdhs.gov 602-364-4561
- Shoana Anderson
  - anderssm@azdhs.gov 602-364-3147

- Surveillance webpage:

http://www.azdhs.gov/phs/oids/epi/flu/az_flu_surv.htm